QLogic 12800 InfiniBand Switches for the IBM Intelligent Cluster

IBM System x at-a-glance guide

The QLogic 12800 InfiniBand switch is a new class of data center InfiniBand interconnect that links HPC resources using a scalable, 40 Gbps, low latency fabric. Customers can tailor the modular product to meet present and future needs. The QLogic 12800 is a series of products that deliver unmatched high-speed networking features and functions.

Figure 1 shows the 12800 switch modules.

Figure 1. QLogic 12800-360 (left) and 12800-180 (right) InfiniBand switches

Did you know?

QLogic 12800 InfiniBand switch series is a part of IBM Intelligent Cluster solution (formerly IBM Systems Cluster 1350). IBM Intelligent Cluster is your key to a fully integrated HPC solution. IBM clustering solutions include servers, storage, and industry-leading OEM interconnects that are factory-integrated, fully tested, and delivered to your door, ready to plug into your data center, all with a single point of contact for support.

Part number information

Table 1 shows the part numbers to order these modules and additional options for them.

Table 1. IBM part numbers for ordering

Description	IBM part number
QLogic 12800-180 QDR InfiniBand Switch Bundle	0449-022
QLogic 12800-360 QDR InfiniBand Switch Bundle	0449-023
QLogic 12800 QDR Single Spine Module	0449-024
QLogic 12800 QDR Double Spine Module	0449-025
QLogic 12800 Management Module	49Y8543
QLogic 12800 24-port 4X QDR Ultra-HD InfiniBand Leaf Module	0449-026
QLogic 12800 18-port 4X QDR Ultra-HP InfiniBand Leaf Module	0449-027
QLogic 12800 Hot-swap Power Supply	49Y8504

The QLogic 12800-180 and 12800-360 QDR InfiniBand director switches, based on QLogic TrueScale ASIC technology, deliver the next evolution in switch fabric performance for High Performance Computing (HPC) environments.

These switches deliver high port density and low power per port:

- The 12800-180 provides 324 QDR ports using 18-port Ultra-High Performance (UHP) leaf modules or 432 QDR/DDR ports using 24-port Ultra-High Density (UHD) leaf modules in a 14U chassis.
- The 12800-360 provides 648 QDR ports using 18-port Ultra-High Performance (UHP) leaf modules or 864 QDR/DDR ports using 24-port Ultra-High Density (UHD) leaf modules in a 29U chassis.

The high-availability 12800 design includes hot swappable InfiniBand spine and leaf modules, fully redundant power and cooling, and redundant management processors supporting chassis management (CLI and GUI), as well as embedded InfiniBand Subnet Managers (SMs). The 12800 also supports advanced QLogic fabric features including adaptive routing, Virtual Fabrics (vFabric), Quality of Service (QoS), and management wizards for automated installation, configuration, and monitoring to maximize operational efficiency.

Benefits

The QLogic 12800 InfiniBand switch offers the following benefits:

- **Low Latency:** The QLogic 12800 provides scalable, predictable low latency, even at 90% traffic use. Predictable latency means HPC applications can be scaled easily without worrying about diminished cluster performance or costly system tuning efforts.
- **Flexible Partitioning:** The QLogic 12800 advanced design is based on an architecture that provides comprehensive virtual fabric partitioning capabilities that enable the InfiniBand fabric to support the evolving requirements of an organization. The TrueScale architecture, together with IFS, allows the fabric to be shared by mission critical applications while delivering maximum bandwidth utilization.

- **Modular Design:** InfiniBand port, power, cooling, and management modules are common in the series, giving customers the flexibility to deploy and grow HPC environments in a cost-effective fashion.
- **Investment Protection:** The QLogic 12800 adheres to the InfiniBand Trade Association version 1.2 specification, ensuring the ability to interoperate with all other IBTA-compliant devices.
- **Highly Reliable:** This system is designed for high availability with features that include: port-to-port and module-to-module failover, non-disruptive firmware upgrades, component level diagnostics and alarming, and both in-band and out-of-band management.
- **Easy to Manage:** The 12800 uses QLogic's advanced IFS software for quicker installation and configuration. IFS has advanced tools to verify fabric configuration, topology, and performance. Faults are automatically isolated to the component level and reported.
- **Simple Installation and Configuration:** Using the installation and configuration wizards contained in the IFS package allows end users to bring up fabrics in days instead of weeks.
- **Power Optimized:** Maximum performance is delivered with minimal power and cooling requirements as part of QLogic's Star Power commitment to developing green solutions for the data center.

Features and specifications

The QLogic 12800 InfiniBand switches include the following features and functions:

- Between 18 and 864 ports of InfiniBand QDR (40Gbps) performance with support for DDR and SDR
  - 40/20/10-Gbps auto-negotiation links
  - Supports Quad Small Form Factor Pluggable (QSFP) optical and copper cable specifications
- TrueScale architecture, with scalable, predictable low latency
  - Scales to 51.8-Tbps aggregate bandwidth
  - Switching latency: 140 to 420 ns
- Multiple Virtual Lanes (VLs) per physical port
  - Virtual lanes: 8 plus 1 management
- Maximum MTU size: 4096 bytes
- Maximum multicast table size: 1024 entries
- Supports virtual fabric partitioning
- Fully-redundant system design
- Option to use Ultra High Density (UHD) leafs for maximum connectivity or Ultra High Performance (UHP) leafs for maximum performance
  - UHP Module: 18 QDR ports
  - UHD Module: 24 QDR ports
- Integrated chassis management capabilities for installation, configuration, and ongoing monitoring
- Optional InfiniBand Fabric Suite (IFS) management solution that provides expanded fabric views and fabric tools
- Complies with InfiniBand Trade Association (IBTA) version 1.2 standard

The Qlogic 12800-360 has the following specifics:

- 18 to 864 ports
- 51.8 Tbps capacity
- Supports up to 36 leaf modules

The Qlogic 12800-180 has the following specifics:

- 18 to 432 ports
- 25.9 Tbps switching capacity
- Supports up to 18 leaf modules

The QLogic 12800 InfiniBand switch family supports the following management methods:

- Command Line Interface
- Optional external server-based InfiniBand-compliant subnet manager
- Optional embedded fabric management
- IBTA-compliant SMA, PMA, and BMA
- Chassis management GUI
- SNMP support
- Access methods
  - 10/100 Ethernet Base-T
  - Serial port (RS-232 with DB9)

The following LEDs are located on QLogic 12800 InfiniBand switches:

- 2 per leaf module plus 1 per InfiniBand port
- 2 per single-spine module
- 4 per dual-spine module
- 3 per power supply module
- 8 per management module
- 3 per serial port/Ethernet module

Supported System x and BladeCenter servers , adapters, and cables

The QLogic 12800 InfiniBand switch supports IBM Intelligent Cluster nodes with InfiniBand adapters installed in the System x or BladeCenter servers. The tables below show core solution components from the IBM Intelligent Cluster Component Guide Release 10A.

QDR InfiniBand solution with System x servers and QLogic 12800 series switches

Table 2 shows core components to create full-speed QDR (40 Gbps) InfiniBand solution using QLogic 12800 InfiniBand switches and System x servers.

Table 2. QDR InfiniBand solution core components for System x

Description	IBM part number or machine type
InfiniBand Host Channel Adapters	
Mellanox ConnectX-2 VPI Single-port QSFP QDR IB/10GbE PCI-E 2.0 HCA	81Y1531
Mellanox ConnectX-2 VPI Dual-port QSFP QDR IB/10GbE PCI-E 2.0 HCA	81Y1535
Mellanox ConnectX Single-Port 4X QDR InfiniBand x8 PCI-E 2.0 HCA	46M2203
Mellanox ConnectX Dual-Port 4X QDR InfiniBand x8 PCI-E 2.0 HCA	46M2199
Compute Nodes	
IBM System x3450	7948
IBM System x3550 M3	7944
IBM System x3650 M3	7945
IBM System x3655	7943
IBM System x3455	7940, 7941
IBM System x3755	7163
IBM System x3850 X5	7145
IBM System x iDataPlex dx360 M2	7321, 7323
IBM System x iDataPlex dx360 M3	6391
Cables	
3m QLogic Optical QDR InfiniBand QSFP Cable	Feature code 1767
10m QLogic Optical QDR InfiniBand QSFP Cable	Feature code 1768
30m QLogic Optical QDR InfiniBand QSFP Cable	Feature code 1769
3m IBM Optical QDR InfiniBand QSFP Cable	Feature code 5989
10m IBM Optical QDR InfiniBand QSFP Cable	Feature code 5990
30m IBM Optical QDR InfiniBand QSFP Cable	Feature code 5991
0.5m QLogic Copper QDR InfiniBand QSFP 30AWG Cable	Feature code 3725
1m QLogic Copper QDR InfiniBand QSFP 30AWG Cable	Feature code 3726
3m QLogic Copper QDR InfiniBand QSFP 28AWG Cable	Feature code 3727

DDR InfiniBand (20 Gbps) solution with BladeCenter servers and QLogic 12800 series switches

Table 4 shows core components to create a full-speed DDR (20 Gbps) InfiniBand solution using QLogic 12800 InfiniBand switches and System x servers.

Table 4. DDR InfiniBand solution core components for BladeCenter

Description	IBM part number or machine type
InfiniBand Host Channel Adapters	
4X DDR InfiniBand CFFh Expansion Card for BladeCenter	43W4423
Chaasis and Compute Nodes	
IBM BladeCenter H chassis	8852
IBM BladeCenter HS21 server	8853
IBM BladeCenter HS21 XM server	7995
IBM BladeCenter HS22 server	7870
IBM BladeCenter LS22 server	7901
IBM BladeCenter LS42 server	7902
IBM BladeCenter JS22 server	7998
IBM BladeCenter QS22 server	0793
Pass-thru Modules and Cables	
4X InfiniBand Pass-thru HSSM for BladeCenter*	43W4419
3m QLogic Optical DDR InfiniBand QSFP-to-CX4 Cable	59Y1908
10m QLogic Optical DDR InfiniBand QSFP-to-CX4 Cable	59Y1912
30m QLogic Optical DDR InfiniBand QSFP-to-CX4 Cable	59Y1916

* The 4X InfiniBand Pass-thru high-speed switch module supports DDR speeds but does not support QDR speeds.

Related publications

For more information, see the following documents:

- IBM US Announcement Letter (May 18, 2010 - Refresh 10A):
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS110-140
- Publications for the Cluster 1350
  http://www.ibm.com/support/docview.wss?uid=psg1MIGR-5080504
- QLogic 12800-360 product page
  http://www.qlogic.com/Products/HPCNetworking/InfiniBandSwitches/Pages/12800360.aspx
- QLogic 12800-180 product page
  http://www.qlogic.com/Products/HPCNetworking/InfiniBandSwitches/Pages/12800180.aspx

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